

Work Order ID 73371

Wednesday, August 31, 2011 1:10:32 PM



Page 1

Item ID: D350-748-241TRN

Accept



Setup

Start



Revision ID:

Item Name: Crosstube Turning Detail

Stop



Start Date: 8/31/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 9/2/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: CL

Date: 11/08/11 Tooling: _____ Date: _____

Run

Start



QC: _____

Date: _____ SPC (Y/N): _____

Date: _____

Stop



| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

| Draw Nbr | Revision Nbr |
|--------------|--------------|
| D350-748-241 | F |

100 0.00

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo 0.00

1 8

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA647
2-Turn first side as per Folio FA647
3- File transition lines smooth.

MM.L 12/01/25

110 0.00

QC1- Inspect dimensions to dimension sheet

Memo 0.00

1 8

Quality Control

MM.L 12/01/25

120 0.00

MORI SEIKI CNC LATHE LARGE

Memo 0.00

1 8

Mori Seiki

1-Turn second side as per Folio FA647
2- File transition lines smooth.
3-Scribe part # as per Dwg D350-748-241

MM.L 12/01/25

Mori Seiki CNC Lathe Large

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| | | | | | | | |
| | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

130

QC1- Inspect dimensions to dimension sheet

0.00

1 8



QC

Quality Control

140

QC8- Inspect parts - second check

0.00



QC

Quality Control

150

Large Fab

0.00

Crosstubes

Memo

0.00

Crosstubes

Grind machining marks.

mmz 12/1/25

D 12-1-26

RG/MO 12/1/26

SEE ATTACHED w/o CHG

PTO

| W/O: | | WORK ORDER CHANGES | | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|--|
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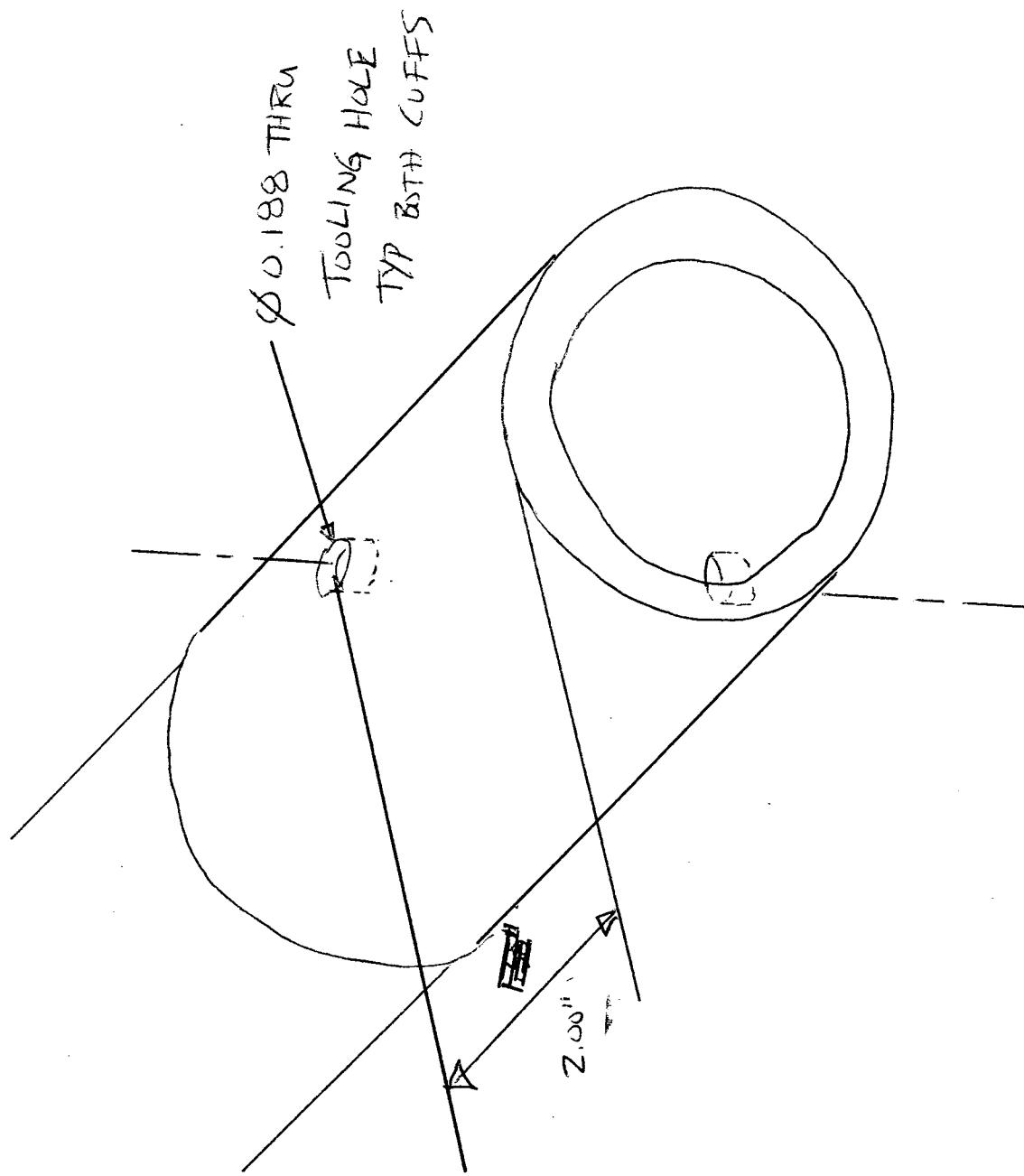
NOTE: Date & initial all entries

| W/O: 13371 | | WORK ORDER CHANGES | | | | | |
|------------|------|--|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
| 12.03.05 | 151 | DRILL Ø0.189 TOWLING HOLE THRU CUFF. QTY(1) PER CUFF, 2" FROM END OF CUFF. DRILL TOWLING HOLES MUST BE PARALLEL WITH HOLE IN OPPOSITE CUFF. SEE ATTACHED DWG | | | | GP 12.03.05 PSI 042 | |
| | | | | | | | |

Part No: D350-948-241 TRN PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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12.03.05

Work Order ID 73371

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Page 3

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Cust Item ID:

Required Date: 9/2/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

160



Outsource process - Heat Treat

0.00

12/02/24 ①

Outsource

Memo

0.00

Outsource process - Heat Treat

Issue P/O: 16274 / 1633
Heat Treat to min 180 KSI As per Dwg D350-748-241
Sand Blast tube after Heat Treat
Possible Supplier: Vac Aero
Ensure Certificate of Conformity is attached

170



Receive & Inspect for Damage & Mat'l Certs

0.00

SP for 12/02/24 D-5-3

Packaging

Memo

0.00

Packaging

Ensure certificate of conformity is attached

180



QC6- Inspect dimensions to drawing

0.00

QC

Memo

0.00

51244C3

POSITIVE RECALL
EFFECTIVE 12/01/24 AUTH
MAILED 12/03/24 DATE 12/03/24

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Page 4

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Cust Item ID:

Required Date: 9/2/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run

Start



QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

Sequence ID/
Work Center ID

190

Operation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

0.00

Packaging

Packaging

Packaging

Memo

Identify and stock in kanban rack
Location: _____

1X

SD

12-5-3

200



QC

Quality Control

QC21- Final Inspection - Work Order Release

0.00

Memo

0.00

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NOTE: Date & initial all entries

Picklist Print

Wednesday, August 31, 2011 1:10:29 PM

Page 1

Work Order ID: 73371



Parent Item: D350-748-241TRN



Parent Item Name: Crosstube Turning Detail

Start Date: 8/31/2011

Required Date: 9/2/2011

Comments: IPP Rev:A New Issue 08-03-06 DD verified b

IPP Rev B Removed polish 08.04.02 EC verified by : DD

IPP Rev D Removed LPS-3 08.06.23 Ec verified by: DD IPP Rev D

11.02.24 as per dwg rev.F DD verf: JLM

11.02.24 as per dwg Rev.F DD Verf: JLM

| Component Item ID/ Item Name | Replacement Item ID | Mfg/ Purch | Bin Item | Primary Location | Last Location | Route Seq ID | Unit of Measure | Qty on Hand | Qty per Kit | Total Qty | Qty Issued | Date Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6015-125 | | Manufactured | No | | | 120 | Each | 22.0000 | 1 | 1 | | | |

Crosstube Material



Crosstube Material

Location

Loc Qty

Loc Code

HAL

22

61380

mm.c

12/01/23

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
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NOTE: Date & initial all entries

| | | |
|--|--------------|--------------|
| DART AEROSPACE LTD | Work Order: | 73371 |
| Description: Crosstube Assembly (AS350/355 High Aft) | Part Number: | D350-748-241 |
| Inspection Dwg: D350-748-241 Rev: D | | Page 1 of 1 |

FIRST ARTICLE INSPECTION CHECKLIST

First Article Prototype

| Inspection Sheet Drawing Dimension | Tolerance | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|------------------------------------|-----------|------------------|--------|--------|----------------------|----------|
| SIDE A | 2.240 | +0.005/-0.000 | 2.245 | ✓ | Jern | CNC-08 |
| | 2.180 | +0.005/-0.000 | 2.183 | ✓ | | |
| | 2.180 | +0.005/-0.000 | 2.184 | ✓ | | |
| | 2.208 | +0.005/-0.000 | 2.212 | ✓ | | |
| | 2.234 | +0.005/-0.000 | 2.238 | ✓ | | |
| | 2.253 | +0.005/-0.000 | 2.256 | ✓ | | |
| | 2.272 | +0.005/-0.000 | 2.276 | ✓ | | |
| | 2.299 | +0.005/-0.000 | 2.303 | ✓ | | |
| | 0.063 | +/-0.010 | .063 | ✓ | Vern | CNC-08 |
| | 4.26 | +/-0.030 | 4.26 | ✓ | | |
| | R0.063 | +/-0.010 | .063 | ✓ | RG | |
| | R0.50 | +/-0.030 | .500 | ✓ | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| SIDE B | 2.240 | +0.005/-0.000 | 2.245 | ✓ | Vern | CNC-08 |
| | 2.180 | +0.005/-0.000 | 2.184 | ✓ | | |
| | 2.180 | +0.005/-0.000 | 2.184 | ✓ | | |
| | 2.208 | +0.005/-0.000 | 2.211 | ✓ | | |
| | 2.234 | +0.005/-0.000 | 2.237 | ✓ | | |
| | 2.253 | +0.005/-0.000 | 2.258 | ✓ | | |
| | 2.272 | +0.005/-0.000 | 2.277 | ✓ | | |
| | 2.299 | +0.005/-0.000 | 2.303 | ✓ | | |
| | 0.063 | +/-0.010 | .063 | ✓ | Vern | CNC-08 |
| | 4.26 | +/-0.030 | 4.26 | ✓ | | |
| | R0.063 | +/-0.010 | .063 | ✓ | RG | |
| | R0.50 | +/-0.030 | .500 | ✓ | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | 122.70 | +/-0.060 | 122.70 | ✓ | topic | MMU-07 |

| | | | | | |
|--------------|--------------|-------------|----------|---------------------|-----|
| Measured by: | <i>M.W.G</i> | Audited by: | <i>D</i> | Prototype Approval: | N/A |
| Date: | 12/01/23 | Date: | 12-128 | Date: | N/A |

| Rev | Date | Change | Revised by | Approved |
|-----|----------|-----------|--------------------|----------|
| A | 07.01.17 | New Issue | (P/O D350-748-201) | KJ/JLM |

| W/O: | | WORK ORDER CHANGES | | | | | |
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NOTE: Date & initial all entries

ULTRA SONIC MEASURMENTS

| Side | LOCATION on tube | R1 | R2 | R3 | R4 |
|------|---------------------|------|------|-------------|------|
| A | | .118 | .163 | | |
| | | .132 | .164 | | |
| | | .121 | .158 | | |
| | | .118 | .157 | | |
| B | | | | .120 | .163 |
| | | | | .128 | .160 |
| | | | | .129 | .157 |
| | | | | .124 | .161 |
| | | | | 350-708-271 | |
| | | | | 23371 | |
| | | | | TM/1A | |
| | | | | | |

| Item | Qty | Part Number | Description |
|------|-----|---------------|--|
| 1 | X | D350-748-241 | CROSSTUBE ASSEMBLY (AS 350/355 HI AFT) |
| 2 | 1 | D6015-125 | CROSSTUBE (OR D6018-125) |
| 3 | 2 | D3502-1 | SUPPORT |
| 4 | 2 | D2856-400-710 | ABRASION STRIP |
| 5 | 1 | AELS-1032-225 | INSERT |
| 6 | 1 | NAS1149D0363J | WASHER (OR AN960JD10) |
| 7 | 2 | MS21920-20 | CLAMP (PER DART SPEC. M-MS21920-20) |
| 8 | 1 | MS27039-1-10 | SCREW |

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 73371
C21108/31

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
 FINISHED LENGTH = 122.700±0.06
 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
 CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
 PAINT OUTSIDE PER DART QSI 005 4.2
 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX
 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
 PER DART QSI 044 6.4 (VIBRATING STYLUS)
 7) WEIGHT: 29.85 lbs
 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
 LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
 BENDING.
 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
 BENDING IS 6% BASED ON O.D.
 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
 VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
 CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
 OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
 NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDDED OUT LONGITUDINALLY.
 CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
 MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
 CRACKING/CHIPPING/GROOVES.
 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
 NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
 CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

| REV. | DESCRIPTION | BY | DATE |
|------------|-------------|--|--------------|
| DESIGN | <i>PP</i> | DART AEROSPACE LTD HAWKSLEY, ONTARIO, CANADA | |
| DRAWN | <i>PP</i> | | |
| CHECKED | <i>PP</i> | | |
| MFG. APPR. | <i>PP</i> | DRAWING NO. | REV. F |
| APPROVED | <i>PP</i> | D350-748-241 | SHEET 1 OF 4 |
| DE APPR. | <i>PP</i> | TITLE | SCALE |
| DATE | 10.11.23 | CROSSTUBE (AS 350/355 HI AFT) | NTS |

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 NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT
 WRITTEN PERMISSION FROM DART AEROSPACE LTD.

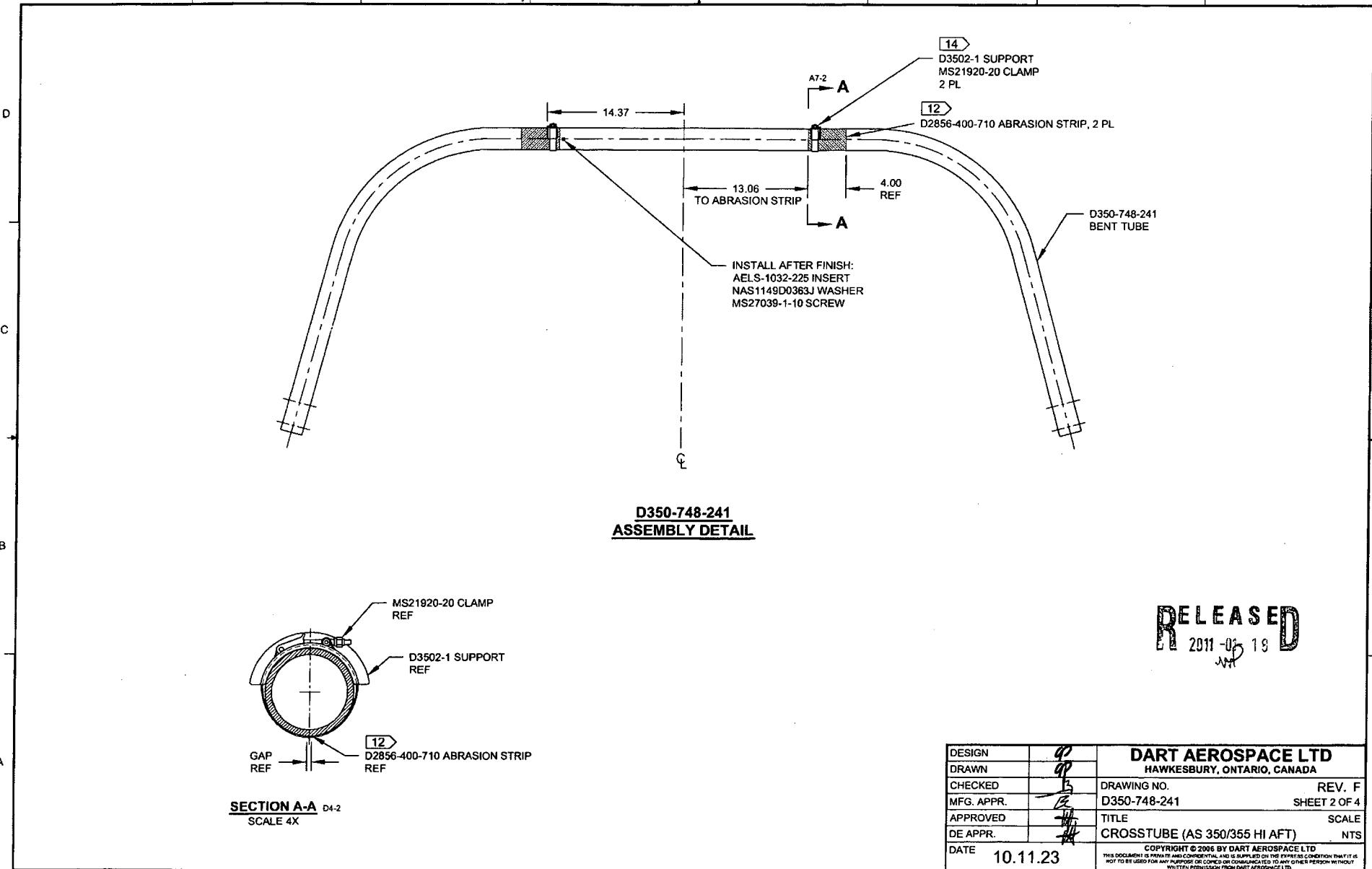
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NOTE: Date & initial all entries

8 7 6 5 4 3 2 1



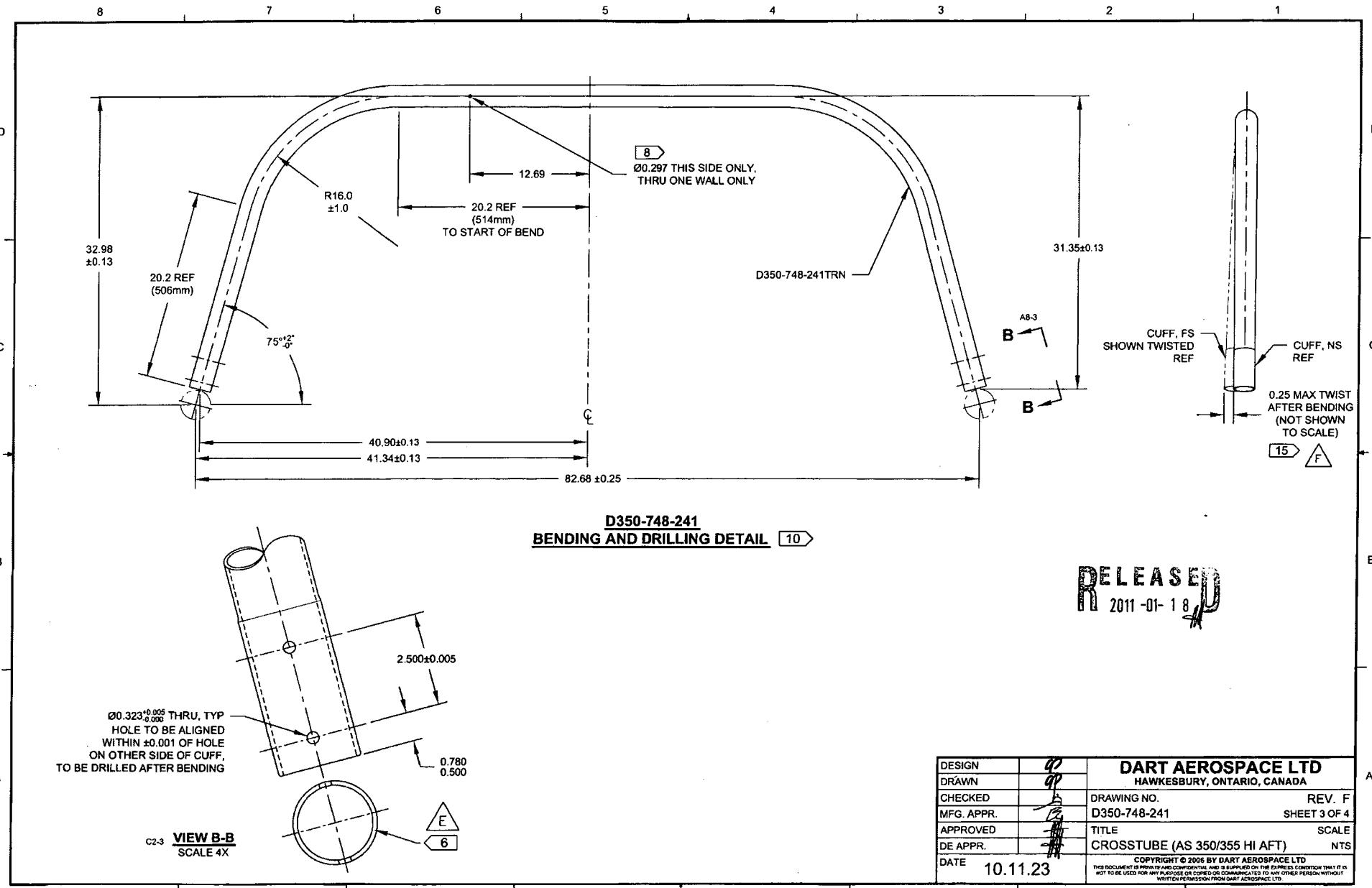
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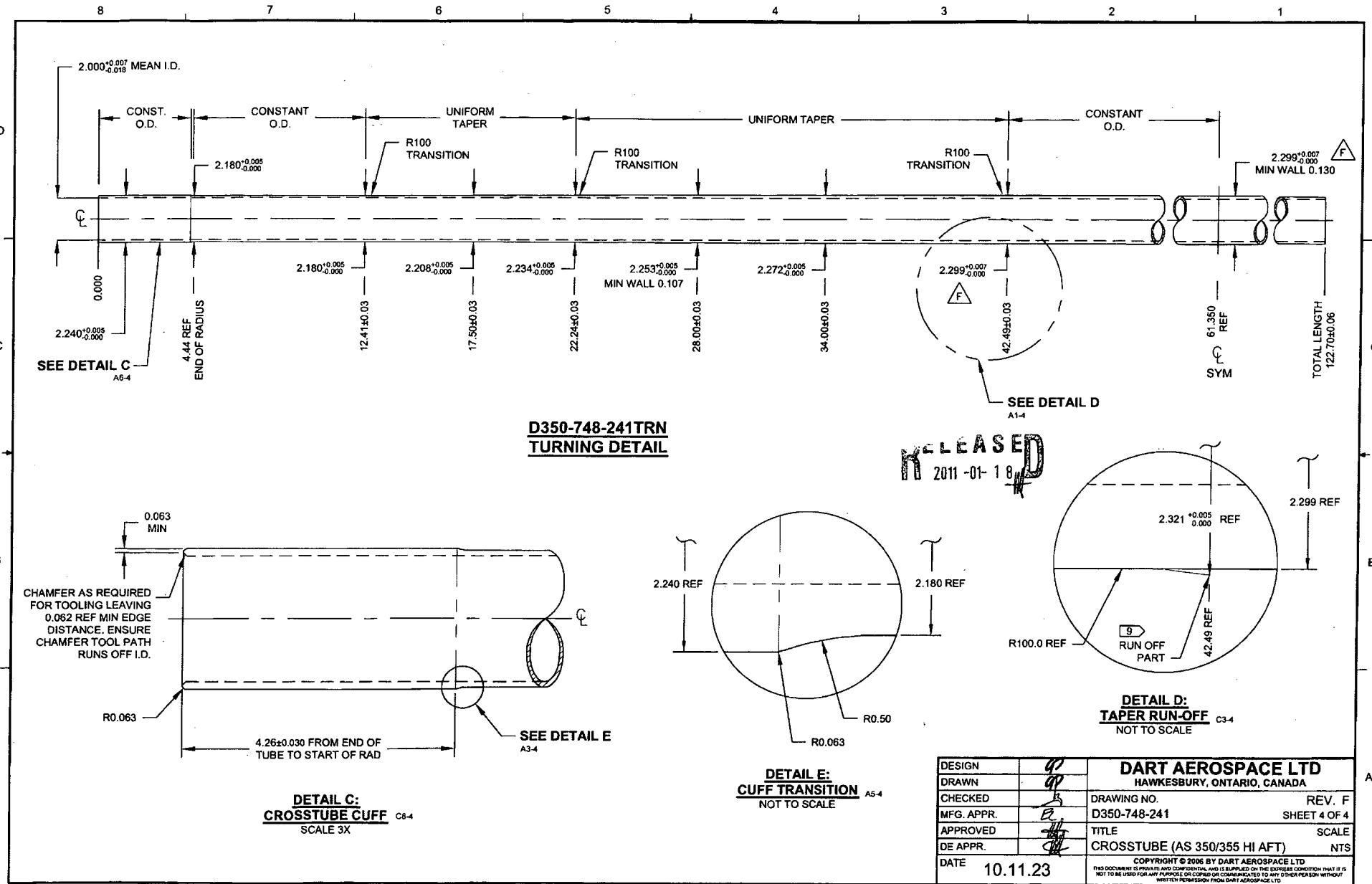
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|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|--|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector | |
| | | | | | | | | |
| | | | | | | | | |

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

| NCR: | | WORK ORDER NON-CONFORMANCE (NCR) | | | | | | |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC Section A | Corrective Action Section B | | | Verification Section C | Approval Chief Eng | Approval QC Inspector |
| | | | Initial Chief Eng | Action Description Chief Eng | Sign & Date | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTE: Date & initial all entries



1000 E. Mermaid La., Wyndmoor (Phila.) PA 19038-8093
Tel. (215) 233-2600 Fax (215) 233-5653

Certification

SOLD TO

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7

March 28, 2012

Metlab Shop Order No: 71502
Purchase Order: 16386
Description: Crosstube
Part No.: D350-748-141TRN
Quantity: 4 Pieces
Weight: 160 Pounds
Material: 4130 Alloy Steel
Specifications: Harden and temper to 180 KSI minimum ultimate tensile strength
IAW MIL-T-6736

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

Results:

Ultimate Tensile Strength: 181/188 KSI*

*Converted from 40/41 HRC surface hardness

**Straightness requirement waived by Dart Aerospace Ltd

Mark Jenkins
METLAB
Quality Representative

Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting



Certification

SOLD TO

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7

March 28, 2012

Metlab Shop Order No: 71503
Purchase Order: 16353
Description: Crosstube
Part No.: D350-748-141TRN
Quantity: 14 Pieces
Weight: 730 Pounds
Material: 4130 Alloy Steel
Specifications: Harden and temper to 180 KSI minimum ultimate tensile strength
IAW MIL-T-6736

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

Results:

Ultimate Tensile Strength: 181/188 KSI*

*Converted from 40/41 HRC surface hardness

**Straightness requirement waived by Dart Aerospace Ltd

METLAB Mark Jenkins
Quality Representative Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting